Title: Rapid Start-up and Loading of an Attached Growth, Simultaneous Nitrification/Denitrification Membrane Aerated Bioreactor

The Membrane Aerated Bioreactor (MABR) is an attached-growth biological system for simultaneous nitrification and denitrification. This design is an innovative approach to common terrestrial wastewater treatments for nitrogen and carbon removal. Implementing a biologically-based water treatment system for long-duration human exploration is an attractive, low energy alternative to physiochemical processes. Two obstacles to implementing such a system are (1) the "start-up" duration from inoculation to steady-state operations and (2) the amount of surface area needed for the biological activity to occur. The Advanced Water Recovery Systems (AWRS) team at JSC explored these two issues through two tests; a rapid inoculation study and a wastewater loading study. Results from these tests demonstrate that the duration from inoculation to steady state can be reduced to two weeks and that the surface area to volume ratio baseline used in the Alternative Water Processor (AWP) test was higher than what was needed to remove the organic carbon and ammonium from the system.